



Alternatives Evaluated

Alternatives Evaluated

To create the Master Plan’s Vision Plan, more than 40 alternatives were studied, evaluated, and developed into many variations. Some of the alternatives are depicted on the following pages. Other alternatives are included in the Appendix.

The result of the evaluation process is a “preferred alternative” that meets the technical and space requirements of a multimodal transportation program combined with development. The preferred alternative also allows convenient connections between modes and achieves other project goals. Each alternative was reviewed using the screening process described below.

No-Build Alternative

The Environmental Impact Statement Process requires a No-Build Alternative composed of regional land-use and transportation projects contained in the DRCOG Fiscally Constrained 2025 Interim Regional Transportation Plan (RTP), the 2003-2008 RTD Transit Development Plan (TDP), and the 2003-2008 DRCOG Transportation Improvement Plan (TIP).

The No-Build Alternative assumes no new major transit investments at Denver Union Station or changes in land use at the site. It provides baseline information that helped evaluat the relative impacts of alternatives. The No-Build Alternative also will be used as the base condition for evaluation of the preferred alternative in the Environmental Impact Statement (EIS.)

Range Of Alternatives

The Range of Alternatives studied through the process are grouped into five main categories. Each presents different locations and arrangements of major transit components.

A Concepts place the main transportation elements (LRT, passenger rail, and bus) parallel to the station. LRT and passenger rail are located at-grade. The regional/intercity bus is elevated one level above grade over passenger rail and LRT, north of the 17th Street right-of-way.

B Concepts place the main transportation elements parallel to the station. LRT and passenger rail are located at-grade. The regional/intercity bus component is located one level below grade.

C Concepts place LRT either parallel or perpendicular to the station, one level below grade, with passenger rail at-grade. The regional/intercity bus facility is located either below grade, at-grade, or above grade depending on the configuration of passenger rail and LRT.

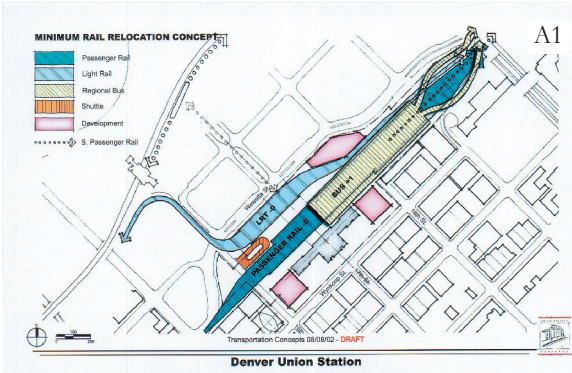
D Concepts place LRT and passenger rail parallel to the station, with LRT elevated one level above grade. Passenger rail is at-grade.

E Concepts locate both passenger rail and LRT one level below grade. The regional/intercity bus facility is located below grade, at-grade, or above grade, depending on the configurations of LRT and passenger rail.

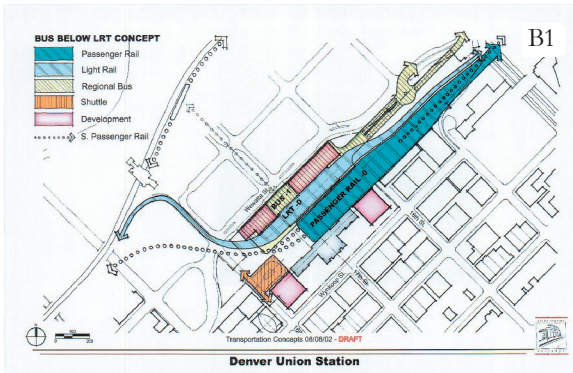
Alternatives Evaluated

LEGEND

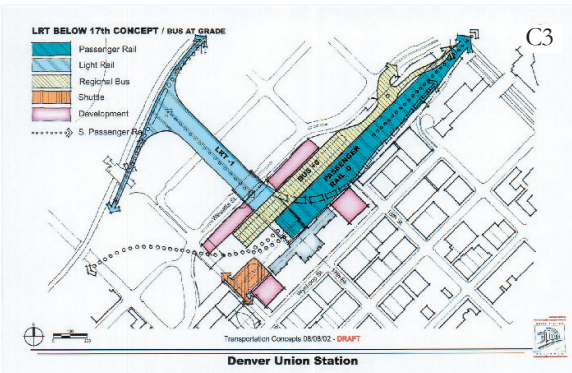
passenger rail
light rail
regional bus
shuttle
development
south passenger rail



‘A’ Alternatives with commercial bus above grade.



‘B’ Alternatives with commercial bus below grade.



‘C’ Alternatives with light rail below grade.

Screening Process

A four-step process was used to evaluate alternatives and their variations.

Step 1: Fatal-Flaw Analysis

A fatal-flaw analysis eliminated alternatives that failed to physically accommodate the rail or bus program or failed to meet a threshold of functionality.

Step 2: General Screening

Fifteen surviving alternatives were then evaluated for operating capacity, mode connections, potential for private development, and use of the historic station for pedestrian circulation.

Step 3: Detailed Screening

Nine alternatives survived and were evaluated using eight categories:

- transportation effectiveness,
- joint development/transit-oriented development,

- effects on the transportation systems,
- financial viability,
- historic preservation,
- effects on the natural and built environment,
- urban design and neighborhood integration, and
- constructability.

Each category contained criteria and measures consistent with project goals and objectives.

Step 4: Additional Alternative Groupings and Evaluation

The six remaining alternatives—three sets of paired alternatives—were grouped on the basis of similar attributes. These were evaluated on the basis of effective service for parking, additional carriers, the 16th Street Mall Shuttle, a Downtown Circulator, and pedestrian circulation.

Three alternatives then remained. They included one alternative that placed both LRT and passenger rail at-grade (A2), one with passenger rail at-grade and LRT underground (C3), and one with both passenger rail and LRT below-grade (E2). These alternatives are shown on the next page.

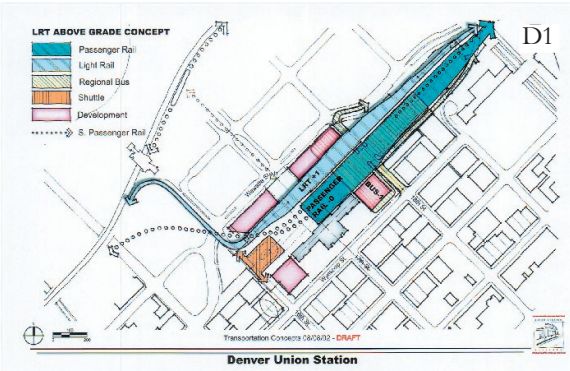
Review of these three alternatives revealed three major issues requiring study:

1) *LRT layout in Alternative C3.* While the stub-end station LRT arrangement functioned adequately, RTD staff preferred a through-station design for operating efficiency and other considerations. Eight variations were considered, including an LRT route under the Wynkoop Street forecourt.

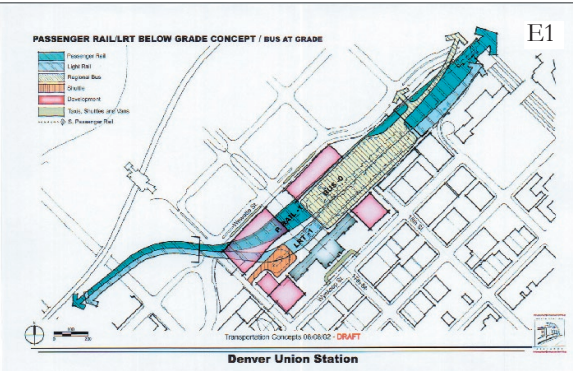
2) *The proximity of the RTD regional and express bus facility to the 16th Street Mall Shuttle.* These components were rearranged to locate the RTD facility as close to the Mall Shuttle as possible with alternative locations for the bus facility.

3) *The effect of LRT at-grade crossings at Wewatta Street.* With up to 48 LRT train crossings of Wewatta Street projected per hour, there were concerns about safety at the intersections of 16th, 18th, and Wewatta Streets, which is designated to become an arterial street with heavy traffic. After further study and discussion, the A2 alternative was eliminated because of the at-grade LRT street crossing.

Major refinements to the two remaining concepts included an LRT through-station on C3 and an underground RTD bus facility in front of the historic building on both the C3 and E2 Concepts. Renamed C and E, these alternatives were analyzed for cost, constructability, and phasing.



‘D’ Alternatives with light rail above grade.



‘E’ Alternatives with passenger rail below grade.

Alternatives Evaluated

LEGEND

passenger rail	
light rail	
regional bus	
shuttle	
development	
south passenger rail	

ELEMENTS CONTAINED IN THE NO-BUILD ALTERNATIVE

- Existing Land-Use Systems
 - 19.5-acre site comprising the Union Station building and surface parking
 - Denver Union Station tunnels
- Existing Transportation Systems
 - Central Platte Valley line and station (C-line)
 - 16th Street Mall extension
 - Amtrak (passenger/express mail)
 - Ski Train
 - Special use trains
 - Tail tracks to Cherry Creek
 - RTD North HOV Busway (High Occupancy Transit (HOT) lanes not included)
- Approved Projects On-Site
 - RTD Bike Station
 - Electric-vehicle hub project
 - Denver Union Station--Wynkoop frontage improvements
- RTD TDP, and DRCOG TIP Projects
 - Southeast Corridor Light-Rail Transit (LRT)
 - 16th and I-25 pedestrian/bike bridge
 - Bike connection from Cuernavaca Park to railroad underpass at I-25
 - Additional regional projects listed in the long-range plan
- Approved Development Projects in the (CPV)
 - Commons PUD – 15th to 20th, Wewatta to Commons Park
 - Prospect Square
 - Prospect Park Apartments
 - Legacy Plaza and parking garage
 - Water Tower Lofts
 - Waterside Apartments
 - The Manhattan Apartments
 - Archstone Commons
 - Hines Terminal Annex Redevelopment
- Approved Transportation Projects in the CPV
 - 16th and Platte Bridge
 - Wewatta Street completion –two lanes 15th to 16th and four lanes 16th to 20th
- Projects not included in the No-Build Alternative
 - West Corridor LRT
 - East Corridor Air Train Commuter Rail
 - FasTracks
 - I-70 Mountain Corridor
 - North and South Front Range Regional Passenger Rail
 - Relocation of Market Street Station Service
 - HOT Lanes

Key Issues Influencing Alternatives:

Rail, Light Rail, and Bus Operation Criteria

With further study, information regarding the rail and bus operations led to the decision that LRT could be placed only between passenger rail and Wewatta Street due to the cross-over and switching problems north of 20th Street. This preferred location allows for easier connections to the CML and to the future Gold Line to Arvada.

LRT Through-Station Requirements

The requirement for an LRT through-station eliminated the possibility of LRT below-grade under 17th Street as a stub LRT station, and completely changed the C3 Concept.

Traffic Impacts on Adjacent Streets, Particularly Wewatta Street

The LRT at-grade option was eliminated because of high future traffic volumes on Wewatta Street. This eliminated the A2 concept from the process. Slip ramps (for bus access to an underground facility) on Wewatta Street were also discarded because of the geometry of the street and the extra street width needed.

Preservation of Public Space at Wynkoop Street Frontage of DUS

The preservation of high-quality public space on the Wynkoop Street side of the building required placing most additional carriers on the Wewatta Street side of the site. The preservation of this space also precluded consideration of any development on the Wynkoop Street side of the historic building.

Bus Access for RTD and Commercial Bus Facility (HOV and Streets)

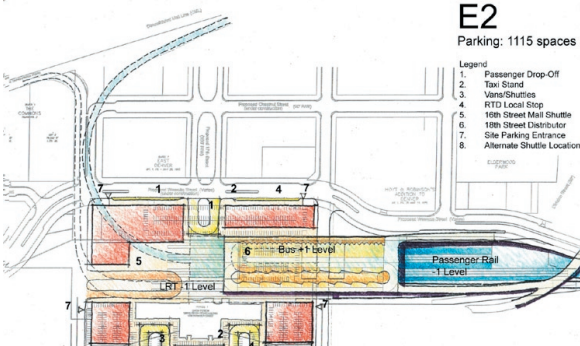
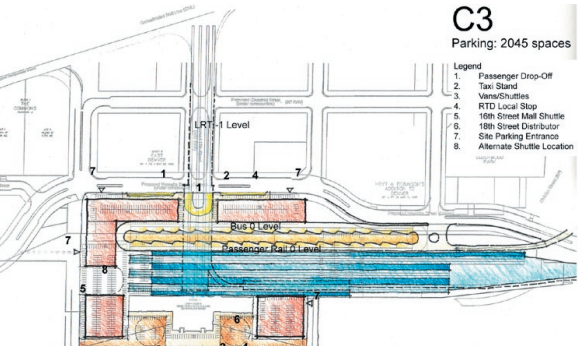
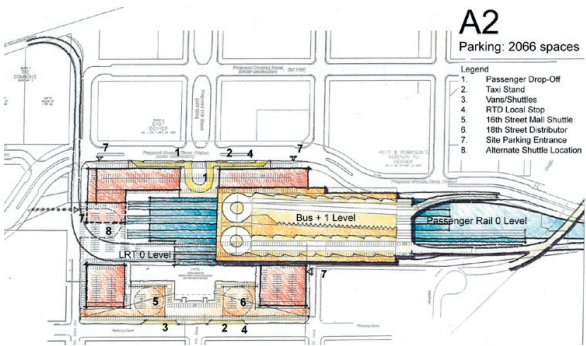
Both the regional and intercity bus facilities need access to the HOV lanes and to the street. This limited the flexibility of their placement.

Site Area and Physical Shape

The limited size of the 19.5 acre site relative to the program and its shape were the largest factors influencing the outcome of the alternatives.

Rail Access to CML and Through-Station Connections

After reviewing alternatives, the Agency Partners strongly preferred a through station.



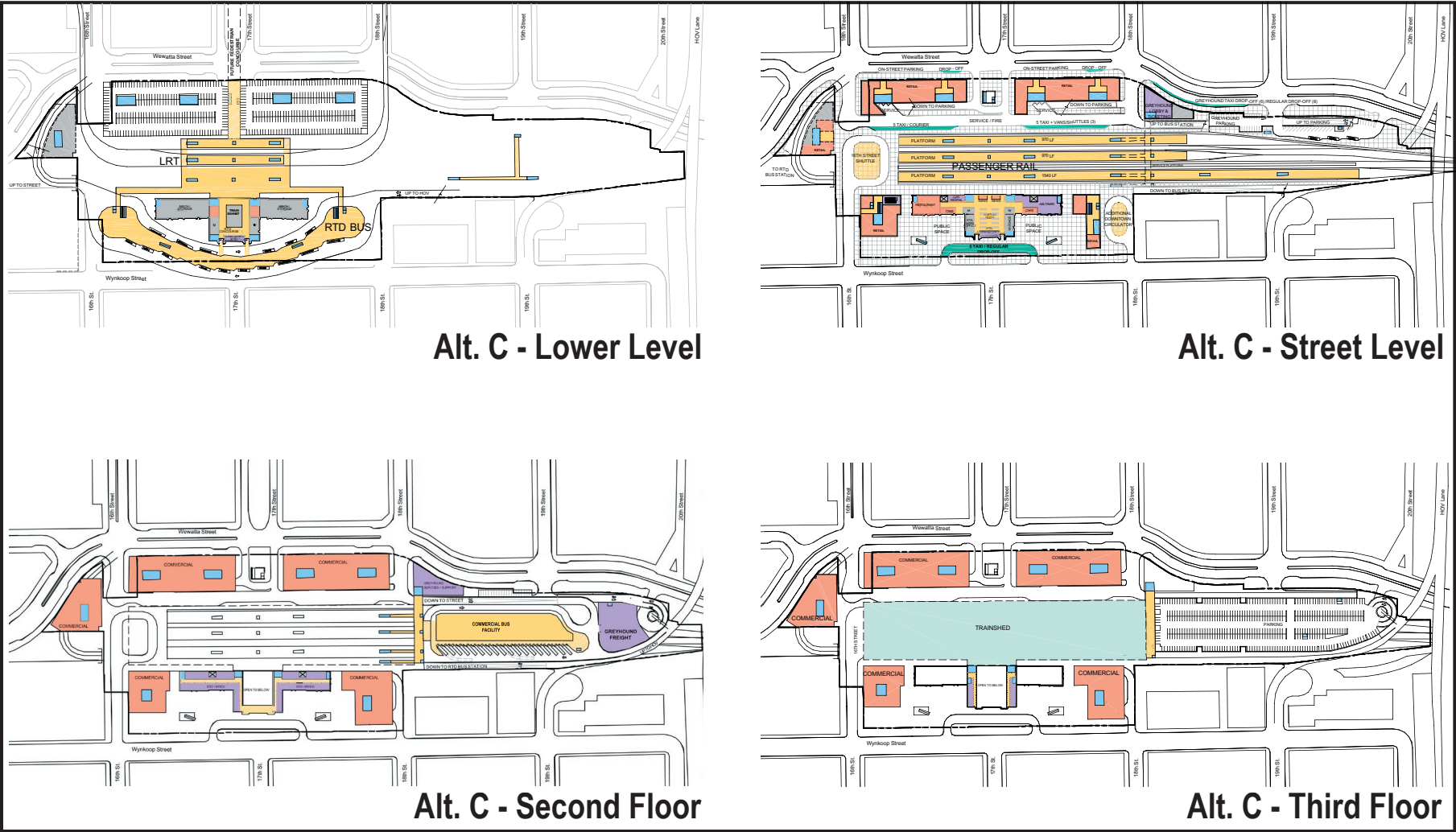
The three remaining alternatives after Step 4 screening.

Reaching the Vision Plan

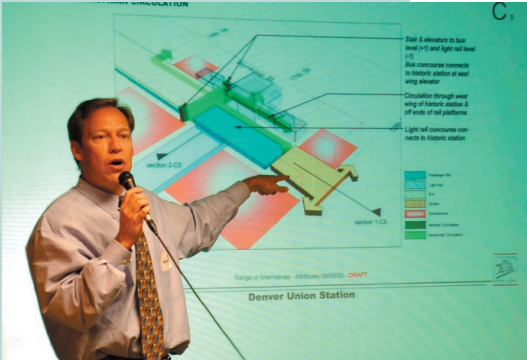
The C and E Alternatives are almost identical. The only major remaining differences were the location of passenger rail and the horizontal alignment of the below-grade light-rail tracks and platforms. But a minor modification to the horizontal location of light rail on the C Alternative would not preclude the future placement of passenger rail underground in either alternative. With this in mind, Alternative E was selected as the Vision Plan.

CML Alternatives

Alternatives were studied that looked at placing a portion of or all of the transportation elements at the CML. Refer to the appendix for these diagrams.



Alternative C with four levels. The C Alternative was similar to the Vision Plan except for the horizontal location of LRT below-grade, and the at-grade location of passenger rail.



“Committed – Creative – Critical – Cooperative.”

These are just some of the words used to describe the unprecedented level of public involvement surrounding the Denver Union Station Master Plan. The dedication of hundreds of people who committed time, expressed ideas, and offered solutions has been essential to the success of the project.



USAC co-chairs.

Public Involvement and Community Outreach

For more than 120 years, Denver Union Station has served the public as a train depot. It is only fitting that a Master Plan designed to transform it into a regional transportation hub would inspire a high level of public involvement. The dedication of hundreds of people who committed time, expressed ideas, and offered solutions was essential to the success of the project.

The following strategies ensured public awareness, response, and consensus.

Town Meetings

Four well-publicized town meetings raised awareness and provided updates on the Master Plan. Public participation also was encouraged several ways:

- advance information on the project’s website and hotline;
- display advertisements in *The Denver Post* and *Rocky Mountain News*;
- Spanish and English-language flyers inserted in community papers;
- press releases distributed to all area media outlets, including radio, TV, and print (see press articles and transcripts of radio and TV segments in the Appendix);
- notification of more than 100 community, neighborhood, and business organizations;
- 150 personal notification letters sent to property owners within a 200-foot radius of the site; and
- videotaping of the first and second town meetings for subsequent airing on the City and County of Denver’s cable television channel, Denver 8.

Participants received an information packet with a program, comment sheet, and more than a dozen other documents, including fact sheets, transportation alternatives, and a vision statement and goals. PowerPoint graphics accompanied each presentation. A professionally moderated question-and-answer session encouraged immediate response. More than 30 participants received answers at the meetings.

Participants were then organized into stakeholder groups to elect delegates and alternates to the Union Station Advisory Committee (USAC) or were encouraged to view transportation alternatives at stations staffed by experts ready to answer questions. Participants also were asked to fill out contact information for the project’s public distribution list. The public contact list had more than 350 e-mail addresses. The e-mail distribution list allowed citizens to ask questions or comment on the project.

Town Meeting 1 - June 20, 2002 – Attendance 200

This meeting had three main goals:

1. Introduction of the Consultant and PMT members.
2. An overview of the Master Plan and Environmental Impact Statement processes.
3. Self-selection of the Union Station Advisory Committee (USAC) members.



Town Meeting no. 2.

Town Meeting 2 – September 12, 2002 – Attendance 154

This meeting presented the range of alternatives for Union Station. Fourteen alternatives stacking the major transportation components in various ways were displayed at stations around the Colorado Convention Center Ballroom. After each alternative was described, the public toured the display boards and asked questions.

Town Meeting 3 – January 27, 2004 – Attendance 130

This meeting was held to present the draft Master Plan to the public and to receive comments on the Vision Plan.

Town Meeting 4 – Date to be determined

The last town meeting will be the public hearing to review the draft Environmental Impact Statement with the public.

Advisory Committees

After the first town meeting, two advisory committees were created to help keep the public and various experts up-to-date on the project. At regular meetings of both advisory committees, the Project Consultant Team and Project Management Team solicited feedback and updated members on the project’s progress. The committees are:

Technical Advisory Committee

The 80-member Technical Advisory Committee (TAC) has representatives from 34 areas of expertise, including rail, public health, communications, utilities, planning, government, public transit, environment, and historic preservation. (See Appendix for a list of TAC agencies and members.)

Union Station Advisory Committee

The Union Station Advisory Committee (USAC), created at the conclusion of the first town meeting, may be the largest public advisory group ever assembled in Denver. Composed of 93 individuals representing 36 stakeholder groups with special interests in the Master Plan, the USAC reviewed 40 transportation alternatives and achieved consensus recommendations on numerous issues, including the structure height and density of Denver Union Station redevelopment. (See Appendix for a list of USAC stakeholder groups and members.)

The USAC was self-selected by a caucus of the 200 participants. The stakeholder group members debated the merits of each potential representative and alternate. Each group elected one representative and one alternate to represent them. This approach to self-selection is considered innovative for an advisory group in Denver.

USAC meetings were held every three weeks during the busiest times of the project. USAC members who could not attend were mailed an agenda packet. Meeting minutes were distributed to each member and posted on the project’s website. To manage this large committee, USAC members elected three co-chairs.

Break-Out Groups

In addition to the general advisory committees, meetings of smaller groups were held as needed to analyze rail, traffic, bus, environment, zoning, historic preservation, and land-use issues. The zoning and land-use break-out group held the most meetings, reaching consensus recommendation on matters related to height and density.



Town Meeting no. 2.

These break-out groups augment the discussions and analyses of TAC and USAC. The break-out groups shared results with all the committee members. The public was invited to attend the group meetings.

Website

www.DenverUnionStation.org provides project information, on meetings, architectural renderings of project alternatives, Environmental Impact Statement updates, and other subjects. The website has been visited thousands of times. In January 2003, for example, the website received 18,549 hits with an average “view” of the site lasting 6 to 10 minutes. The *Contact Us* and *Public Outreach* sections were consistently in the top 10 viewing sections on the website.

Some website visitors asked general project questions which could be answered immediately. Others asked to be included on the e-mail list or offered comments, suggestions, or transportation alternatives which

were directed to consultants. Every e-mail received a computer-generated thank-you that also provided information about upcoming public meetings. Every e-mail was sorted, catalogued, and filed by topic in a comment database. Topics included land use, environmental impact, community impact, aesthetics, view corridor, and transportation components.

Hotline

A local 24-hour English and Spanish hotline was established for those without Internet access. The voice mail message was updated regularly and relayed upcoming meeting information. The hotline provided a place for citizens to voice their questions, comments, or concerns. The hotline is checked regularly. Calls receive a response and are archived in a hotline database file.

Public Comments

Comment sheets recorded questions and comments at neighborhood meetings. Comments were recorded and received a response. Most of the project’s comments were received from the website, e-mail, or in meetings.

Media

Press releases were sent regularly to all media outlets, including print, radio, and TV. The press was also invited to periodic debriefings. Dozens of newspaper articles and radio and television segments provided the public regular reports. Television stations also carried live interviews with team members. Denver Channel 8 covered the town meetings on its cable channel.



DUS Visits	
RTD Transit <i>Express & Regional Bus, Local, Limited & Circulator, Mall Shuttle, Light Rail, Commuter Rail</i>	<i>visits</i> 95,000
Commercial Carriers <i>Taxis, Rental Cars, Vans and Shuttles, Ski Area Shuttles, Van Pools, Limousines, Courier Services, Private Vehicle Drop-Off at Commercial Bus, Commercial Buses</i>	20,000
Development Trips	15,000
Estimated Total Visits	130,000

Transportation and Circulation

Understanding the surface transportation needs of the Vision Plan is key to accommodating the new development that will be in place at DUS. This understanding comes from identifying the transportation associated with the no-build condition (a condition defined as the projects currently identified and funded), and comparing that to the future Vision Plan. In identifying the transportation needs, the Vision Plan has taken into account future development around the DUS site in the Commons Neighborhood and adjacent properties, as well as the growth in regional travel demands.

The Vision Plan includes office, residential and retail space in addition to the transit-related components of the site. This development program is based on a market analysis for a reasonable amount of development that could occur at DUS in the next 20 years. These numbers do not reflect the full build-out of the zoning for the site. This development program along with the associated transit uses will require approximately 2,100 parking spaces on the site. These parking numbers are based on the new T-MU-30 zoning for the site, and reflect a substantial reduction in required parking (up to 50%) allowed by the T-MU-30 zoning because of its proximity to a major multimodal transit hub.

The analysis of the transportation and circulation at DUS included estimates of the number of trips and visits (people or vehicles), RTD transit conditions, bicycle conditions, pedestrian conditions, commercial carriers, intersection operations, and parking. The same level of analysis was conducted for each mode; the intersection operations are discussed in greater detail given the need for off-site mitigation.

Total Visits

While the various transportation modes utilize differing forms of measurement for projected trip and vehicle activity at DUS, a common measurement of “daily visits” to the site was devised to reflect the total level of transportation activity from all mode types expected for the facility. A visit is defined as entering and leaving the DUS property, thus a commuter who passes through DUS twice a day makes two visits. The total visits to DUS on a typical weekday in 2025 has been estimated at approximately 130,000. Of these visits, the vast majority (95,000) occur via RTD transit vehicles which are calculated using projected boardings and alightings. The remaining visits are split between the on-site development (15,000) measured as projected automobile trips and the commercial carriers (20,000) calculated based upon a projected number of total vehicles. The total number of visits represents the culmination of all technical data related to trips generated by all modes.

Trips at DUS

Four categories of transportation will generate trips to and from the DUS site: Automobiles related to new development, transit boardings and alightings associated with RTD’s program, Commercial Carriers, and pedestrians. Potential future regional passenger rail service for the North Front Range, South Front Range and I-70 Mountain Corridor was not included in this analysis due to the fact that they are undefined projects at this point. The number of trips at DUS, as distinguished from “visits” as defined above, may be defined as either the number of people or vehicles

depending on the type of trip being discussed. The trips associated with the new development at DUS (the office, commercial, and residential) are defined in terms of vehicle trips, as are the commercial carriers. The transit trips associated with RTD’s program of buses, light rail, and commuter rail are defined in terms of the number of people boarding or alighting RTD’s transit vehicles.

Automobile Traffic Related to New Development

Proposed development at DUS will generate approximately 9,800 daily auto trips. Most of these trips are associated with the new office and retail development on the site. Projections indicate 840 inbound trips in the A.M. Peak Hour, and 950 trips outbound at the P.M. Peak Hour associated with the new development. The majority of these trips will be focused on the intersection of 19th and Wewatta Streets, which is the access for 68 percent of the parking spaces for the site at the parking structure located between 18th and 20th Streets. The remainder of the site parking is accessed either at 17th and Wewatta or 18th and Wewatta Streets. This category accounts for 15,000 of the total 130,000 daily visits.

RTD Transit Boardings and Alightings

Boardings (getting on a transit vehicle), alightings (getting off a transit vehicle) and through trips (passengers not changing transit vehicles) were studied for the Vision Plan, including pedestrians who walk to or from DUS. For pedestrians, a boarding is defined as a pedestrian walking to DUS while an alighting is a

DUS RTD Transit Boardings, Alightings and Through Trips - Year 2025

RTD Transit Mode	2025 No-Build		2025 Vision Plan	
	Peak Hour	Daily	Peak Hour	Daily
Express and Regional Bus	4,300	18,900	2,710	14,500
Local, Limited, Circulator, Mall Shuttle, and Pedestrians	5,900	46,100	12,690	83,700
Light Rail	400	2,100	9,360	51,900
Commuter Rail	0	0	7,490	40,900
Total	10,600	67,100	32,250	191,000

Source: RTD/TranSystems/PB

pedestrian walking from DUS. With the implementation of the Vision Plan, DUS will have 190,000 boardings, alightings and through trips on a typical weekday by 2025. Of these, 9,900 are passengers that pass through DUS without changing vehicles. In the morning peak hour, approximately 60 percent of the people arriving at DUS are destined for the Downtown area. The remaining 40 percent are passing through DUS by either remaining on the same vehicle or transferring to another and leaving Downtown Denver. Most of those destined for Downtown will predominately walk or will use the Mall Shuttle or proposed Downtown Circulator. The split between the Mall Shuttle and the Downtown Circulator will depend on the type of technology selected for the circulator and the route and schedule of this new service. This category accounts for 95,000 of the total 130,000 daily visits.

Commercial Carriers

The number of commercial carriers -- shuttles, taxis, vans, limousines, rental cars, van pool, and commercial buses -- will depend largely upon available space and negotiations with private carriers for the use of that space, and could range from 1,150 to 2,300 vehicles per day. Therefore, precise trip volumes generated from commercial carriers are not identified. This category accounts for 20,000 of the total 130,000 daily visits.

Pedestrians

The pedestrians at DUS are comprised of those who walk onto the site and exit via another mode, those who arrive via another mode and exit as a pedestrian, and those who walk to and from the site. The majority of these trips are paired with either another transit or commercial carrier mode. Using this definition and not including on-site circulation, the number of pedestrians at DUS is approximately 37,500 per day. An estimated 36,000 of these pedestrian trips access or egress the site via transit. These trips are included in the 130,000 daily visits as a component of the transit or development related trips.

RTD Transit Conditions

To better understand the impacts of RTD’s transit operations at DUS, a comparison was undertaken with and without the Vision Plan. As a baseline, there are no significant changes in transit service anticipated in the area of Denver Union Station for the Year 2025 No-Build, with the exception of the Local and Limited Route 6, which may utilize Wewatta Street upon the street’s completion. Though the Denver Union Station site would continue to be served by some bus routes, the Regional and Express buses still would use Market Street Station under the No-Build Scenario.

RTD projected transit ridership for DUS for the Vision Plan using models and procedures developed for this purpose. Boardings, alightings and through trips at DUS for the No-Build and Vision Plan scenarios from the most recent model runs are shown on page 74.

The projected ridership on the Mall Shuttle will approach its capacity of 5,500 to 6,000 passengers per hour at DUS. This will increase the need for an additional circulator to distribute transit riders to and from the station in the peak hours. The Vision Plan assumes the presence of another distributor mode such as a Downtown Circulator. The technology of this Downtown Circulator is undefined and is being looked at as part of the Downtown Multimodal Access Plan, currently underway. For the DUS Vision Plan, this circulator was assumed to be a rubber-tired vehicle operating with similar characteristics (acceleration, deceleration, and turning radii) as a bus, although other vehicle types or technologies also could be accommodated. For commuters taking a shuttle to their final destination, the 16th Street Mall Shuttle and the Downtown Circulator each will handle approximately half the demand.

Bicycle Conditions

Currently, bicycles can access the site along Wynkoop Street on the dedicated bike lane, or at 16th Street from the Commons Neighborhood. Additional bicycle lockers and racks were installed in 2004. It is anticipated that with or without the DUS development, a Denver Bicycle Master Plan recommendation to add a bicycle lane along the 16th Street Mall connecting the bike lanes on Wynkoop Street to Wewatta Street and the Millennium Bridge should be completed. A Bike Station included in the DUS Vision Plan will be equipped with such amenities as bike parking, bike repair, bike accessories, transit pass sales, and restroom/changing stalls. It may also include bike rentals and a café or snack bar.

Pedestrian Conditions

Pedestrian facilities will be provided on the site to enhance circulation around and through Denver Union Station. Signalized pedestrian crossings will be provided at the intersections on Wewatta (at 16th, 17th, 18th, and 19th Streets) and on Wynkoop (at 16th, 18th, and 19th) to enhance the ability of pedestrians to access DUS from neighboring blocks. The intersection of 17th and Wynkoop Streets, which currently operates under an all-way stop condition, will not have a signalized crossing, however pedestrians will be able to easily cross this intersection as all vehicles are required to stop. Pedestrians will be able to pass through the site at-grade at 16th, 17th, and 18th Streets as part of the Vision Plan, and between 16th and 18th Streets at either side of the historic station.

Commercial Carriers

In development of the Denver Union Station Vision Plan, the Commercial Carriers are defined as those modes and services other than RTD’s transit services. Commercial carriers include auto rentals, taxis, vans, shuttle services, Amtrak, Ski Train, intercity buses, charter, and tour buses. Commercial carriers operate independent of other modes and contribute to a more comprehensive mix of transportation services at DUS.

Demands for commercial carriers at DUS range from shuttles to taxis to other commercial buses. The number of bays for each of these carriers is summarized in the table below. The commercial bus drop-off area refers to both private vehicles and non-bus commercial vehicles (taxis, vans, shuttles, etc) which may serve the commercial bus facility. Curbside and parking spaces/ bays available for the commercial facility are projected to accommodate the upper end of demand.

In addition to these commercial carriers, Amtrak (currently 2 trains per day) and the Ski Train (2 trains per day on a seasonal partial week basis) will also produce marginal amounts of automobile traffic at the site. However, this traffic will vary more from day to

day, particularly with ski trains. These two commercial carriers may generate between 100 and 500 vehicles per day.

Parking

New development at DUS requires a total of 2,095 parking spaces for the office, retail, residential, and transportation uses.

The largest reservoir of parking is located above the Commercial Bus Facility between 18th and 20th Streets in four decks of parking. This parking structure contains the majority of the site parking with approximately 1,700 spaces. Access for this parking is located at the intersection of 19th and Wewatta Streets. Additional parking is provided in the development buildings along Wewatta Street between 16th and 18th Streets. Access for this parking is from 17th and Wewatta and 18th and Wewatta Streets. Surplus parking spaces (those that exceed the zoning required minimums) are provided in the parking structure and will serve as available parking to improve the efficiency of the parking structure and could be permanently allotted to future uses depending on demand.

There are a number of parking areas that are close to DUS and connected to the site via transit. These include the Pepsi Center, Six Flags-Elitch Gardens, Invesco Field at Mile High, Coors Field, and many nearby parking lots, structures, and on-street meters. Although parking associated with development at DUS is provided on site, these other parking facilities could be tapped if additional parking is needed. No formal discussions have occurred between the major venues and DUS, but these venues routinely share parking during major events, and DUS could play a role in LoDo’s parking strategy.

Parking Summary for the Vision Plan:		
Parking for Transit		
RTD parking		250 spaces
Ski Train		200 spaces
Amtrak Parking		100 spaces
Greyhound Parking		40 spaces
Rental Car Parking		30 spaces
Parking for Development		
Office Development		950 spaces
Retail Development		150 spaces
Residential Development		300 spaces
Historic Station		<u>75 spaces</u>
Total Required Spaces/T-MU-30		2,095 spaces

Site Requirements for Commercial Carriers

Mode	Space Provided	Daily Vehicles
Taxi	15 positions	150-500
Rental Cars	30 parking spaces	120-300
Vans and Shuttles	3 dedicated bays	100-200
Ski Area Shuttles	1 dedicated bay	10-20
Van Pool	Drop-off area	10-20
Limo	1 dedicated bay	10-20
Courier Services	Loading Zone	10-50
Commercial Bus	18 positions	140-160
Private Vehicle Drop-off at Commercial Bus	8 spaces or positions	500-1000
Amtrak and Ski Train/Private Vehicle Pick-up/Drop-off	Track 1 & Track 2/ Drop-off areas	100-500
	Total	1,150-2,770

Source: TranSystems

Intersection Conditions

The study intersections were evaluated based on the existing A.M. and P.M. Peak Hour traffic and the results of this analysis are expressed by a Level of Service (LOS). Level of Service is a ranking of the operating conditions at an intersection ranging from “A” to “F”. LOS A closely represents free-flow conditions with little impedance to drivers while LOS F represents extreme congestion where it can take several cycles of the traffic signal to travel through an intersection. Incremental rates of B, C, D and E reflect increasing delays experienced by motorists, with LOS D representing the minimal desirable operating conditions for the City and County of Denver. The study intersections are currently operating at level of service (LOS) D or better during the periods analyzed.

No-Build Conditions

The no-build condition examines future funded improvements in the area (including the Commons Neighborhood) without any new development at DUS. The projected Year 2025 No-Build Peak Hour traffic volumes and the study intersections are projected to operate at acceptable levels of service (D or better) in the Year 2025 No-Build conditions, with the exceptions of the following intersections:

- Speer Boulevard and Wewatta Street – This intersection is projected to operate at LOS F in both the A.M. and P.M. Peak Hours.
- 15th Street and Wazee Street – This intersection is projected to operate at LOS F during the P.M. Peak Hour.
- 17th Street and Blake Street – This intersection is projected to operate at LOS F during the P.M. Peak Hour.

Vision Plan Conditions

The study intersections for the Year 2025 Vision Plan conditions were also evaluated based on the A.M. and P.M. Peak Hour traffic volumes, taking into account RTD’s transit program, vehicle traffic generated at the site by the additional office, commercial and residential development, commercial carriers, pedestrians and bicycles. While the majority of the intersections are projected to operate at acceptable levels of service (LOS D or better), there are some locations which are projected to operate at a lower level of service (LOS F).

- Speer Boulevard and Wewatta Street – This intersection is projected to operate at LOS F in both the A.M. and P.M. Peak Hours.
- 15th Street and Wewatta – This intersection is projected to operate at LOS F in the P.M. Peak Hour.
- 15th Street and Wynkoop – This intersection is projected to operate at LOS F in the P.M. Peak Hour.
- 15th Street and Wazee Street – This intersection is projected to operate at LOS F during the P.M. Peak Hour.

- 17th Street and Blake Street – This intersection is projected to operate at LOS F during the P.M. Peak Hour.

Baseline Traffic Volume Increases

Several of the major roads in the study area are anticipated to experience significant growth regardless of the Denver Union Station development.

- Traffic volumes on Speer Boulevard are anticipated to increase approximately 2,450 vehicles in both Peak Hours.
- Traffic volumes on 15th Street are anticipated to increase approximately 1,150 vehicles in both Peak Hours.
- Traffic volumes on 20th Street are anticipated to increase approximately 1,125 vehicles in both Peak Hours.

While the streets in the Central Platte Valley (Wewatta and Chestnut) are anticipated to experience significant traffic growth, the growth on local streets (Wynkoop and Wazee) in LoDo is less dramatic. Volumes on Wynkoop and Wazee Streets are anticipated to increase from existing conditions to Year 2025 No-Build conditions by 225 vehicles in both the Peak Hours, which correspond to an additional 2.5 to 5 vehicles per minute. This growth can be accommodated on these streets while still providing a relatively high level of service for pedestrians and bicycles.

Vision Plan Traffic Volume Increases

While the major arterials such as Speer, 15th Street, 20th Street, and Blake Street will see only a minimal growth (generally five to ten percent) between the Year 2025 No-Build conditions and the Year 2025 Vision Plan, other streets in the area will see a more significant change.

- Traffic volumes on Wewatta will increase by almost 1,000 vehicles in the Peak Hour.
- The local roads in LoDo will see an increase in traffic volumes with the connection of 18th Street from Wewatta to Wynkoop Street. An increase of anywhere from 250 to 500 vehicles is anticipated on 18th Street.

It is important to note that as development plans mature for DUS, detailed traffic studies will be required which will outline the impacts and improvements of the future development.

Intersection Improvements

Several improvements have been identified to accommodate the effect of Denver Union Station development on the study intersections. The following list summarizes the improvements identified for the Vision Plan at the intersections expected to operate over capacity:

Speer Boulevard and Wewatta Street

- Construct a second southbound left-turn lane.
- Construct a northbound right-turn lane.
- Construct a second westbound left-turn lane.
- Convert the second westbound through lane to a right-turn lane.

15th and Wewatta Street

- No improvements were identified at this location due to the constraints of adjacent development.

15th and Wazee Street

- Only limited improvements are identified at this location due to the constraints of adjacent development.
- Construct an eastbound left-turn lane on Wazee Street (This may require on-street parking restrictions on Wazee Street.)
- This may require on-street parking restrictions on Wazee Street.

18th Street

- Convert to two-way traffic from Wynkoop to Blake Street.

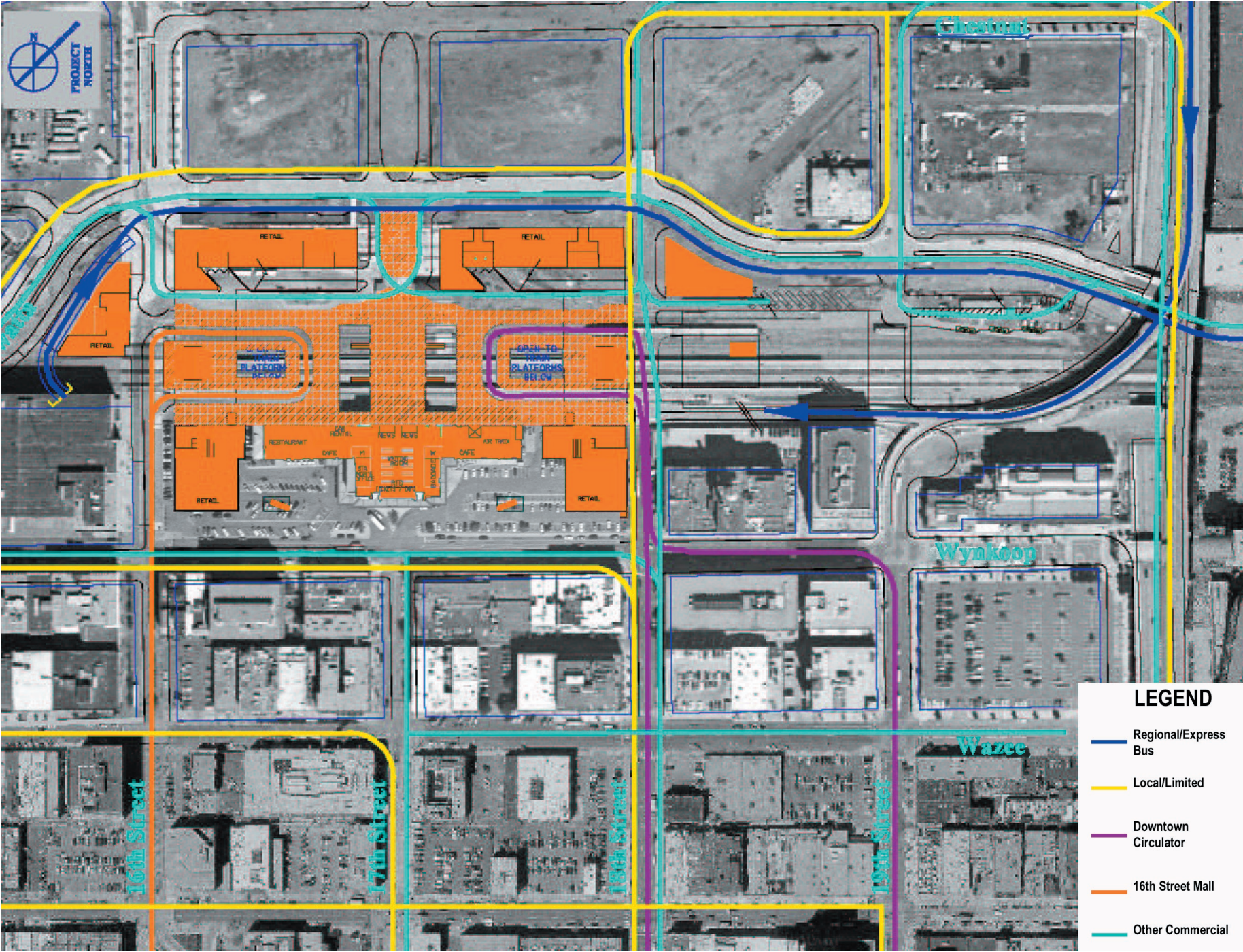


Diagram showing circulation routes for buses and commercial carriers.

The conversion of 18th Street to two-way provides a convenient alternative to congestion on 15th Street and Speer Boulevard. The effects of this change will be a minor traffic increase on 18th Street, and lower traffic volumes on 15th, 17th, and Speer Boulevard. Combined with the available transit alternatives and the less-congested 20th Street, this provides drivers opportunities to avoid congestion in the study area. Other enhancements, such as ITS (Intelligent Transportation Systems) signs could direct drivers to alternative routes.

Circulation

Adequate traffic circulation around the DUS site is critical to the Vision Plan’s success. Not only do private vehicles need to access the site, but the commercial carriers such as taxis, shuttles, vans, buses, and service vehicles will need easy access to the site and be able to circulate around the site to serve the various needs of the traveling public.

Wewatta Street will serve as the major access point for the site, with Wynkoop Street serving as a secondary access point. When 18th Street is completed, this through-movement will help distribute commercial carriers around the site, and help to distribute vehicles to destinations around Downtown. The circulation benefits of 18th Street as a through street are increased site connectivity to Downtown without having to use 15th, 20th, or 23rd Streets, better access for vehicles to site parking and services, and better on-site circulation for taxis, shuttles, vans, limousines, and buses.

Major access for RTD’s Regional and Express buses will be from either the HOV ramp at 20th Street, or along Wewatta to the 16th and Wewatta Street intersection with street access for the below-grade bus facility. Local and limited buses will access the site on 15th, 18th, Wewatta, and Wynkoop Streets.

The Vision Plan assumes the Downtown Circulator will access the site from 18th Street, with potential connections to the Commons Neighborhood along 18th Street, depending on the final mode and routing. The 16th Street Mall Shuttle will continue to access the site along the 16th Street Transit Mall.

Commercial buses will enter the commercial bus facility either from the 20th Street HOV ramp or from 18th Street. Other commercial carriers will enter the site from Wewatta Street at 16th, 17th, or 18th Streets. Taxis and private vehicles can access the site curbside on Wynkoop Street.

